Stochastic_Processes

sec 2- Report 1

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Sec 3

Q 5:- A) $S = \{1, 2, \dots, 6\}$

$E = \{2, 4, 6\} \Rightarrow P(E) = \frac{3}{6} = \frac{1}{2}$

B) King cards = 4

$P(\text{King}) = \frac{4}{52} = \frac{1}{13}$

C) $P(\text{All Head}) = \frac{1}{8} \Rightarrow P(\text{tail}) = \frac{7}{8}$

D) total sample points = 12 $\Rightarrow P(\text{white}) = \frac{2}{12} = \frac{1}{6}$

Q6:- $P(\text{Defective}) = 5/15 = 1/3$, $P(\text{Not defective}) = 2/3$

A) $P(\text{Non defective}) = \frac{2}{3} * \frac{2}{3} * \frac{2}{3} = \frac{8}{27}$

B) $P(\text{one defective}) = \frac{1}{3} * \frac{2}{3} * \frac{2}{3} + \frac{2}{3} * \frac{1}{3} * \frac{2}{3} + \frac{2}{3} * \frac{2}{3} * \frac{1}{3} = \frac{4}{27} * 3 = \frac{12}{27}$

C) $P(\text{At Least one}) = 1 - P(\text{Non defective}) = 1 - \frac{8}{27} = \frac{19}{27}$

Q 8:- A) $P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{3}{8} + \frac{1}{2} - 4 = \frac{5}{8}$

B) $P(A^c) = 1 - P(A) = 1 - \frac{3}{8} = \frac{5}{8}$

C) $P(A^c \cap B^c) = P((A \cup B)^c) = 1 - P(A \cup B) = 1 - \frac{5}{8} = \frac{3}{8}$

D) $P(A^c \cup B^c) = P((A \cap B)^c) = 1 - P(A \cap B) = 1 - \frac{1}{4} = \frac{3}{4}$

E) $P(A \cap B^c) = P(A) \cdot P(B^c) = \frac{3}{8} * (1 - 1/2) = \frac{3}{16}$

F) $P(A^c \cap B) = P(A^c) \cdot P(B) = (1 - \frac{3}{8}) * \frac{1}{2} = \frac{5}{16}$

Q 13:- Required : Proof $\Rightarrow B - A = B \cap A^c$

Proof: $B \cap A^c = B \cap (S - A) = (B \cap S) - (B \cap A)$

$= B - (B \cap A) = (B - B) \cup (B - A)$

$= B - A$

Q15:- $P(A) = 2P(B)$ & $P(B) = 2P(C)$

$P(A) + P(B) + P(C) = 1$

$2P(B) + 2P(C) + P(C) = 1$

$2 * 2P(C) + 3P(C) = 1 \Rightarrow P(C) = \frac{1}{7}$

$P(B) = \frac{2}{7}$, $P(A) = \frac{4}{7}$

Q20:- A) $S = \{ (H_1, H_2, 1), (H_1, H_2, 2), \ldots, (H_1, H_2, 6),$
$(T_1, H_2, 1), (T_1, H_2, 2), \ldots, (T_1, H_2, 6),$
$(H_1, T_2, 1), (H_1, T_2, 2), \ldots, (H_1, T_2, 6),$
$(T_1, T_2, 1), (T_1, T_2, 2), \ldots, (T_1, T_2, 6) \}$

B) $A = \{ (H_1, H_2, 2), (H_1, H_2, 4), (H_1, H_2, 6) \}$

$B = \{ (H_1, H_2, 2), (T_1, H_2, 2), (H_1, T_2, 2), (T_1, T_2, 2) \}$

$C = \{ (T_1, H_2, 2), (T_1, H_2, 3), (T_1, H_2, 5),$
$(H_1, T_2, 2), (H_1, T_2, 3), (H_1, T_2, 5) \}$

C) $A \cap B = \{ (H_1, H_2, 2) \}$

$(B - A) - C = \{ (T_1, T_2, 2) \}$

$B \cup C = \{ (H_1, H_2, 2), (T_1, T_2, 2), (T_1, H_2, 2),$
$(T_1, H_2, 3), (T_1, H_2, 5), (H_1, T_2, 2),$
$(H_1, T_2, 3), (H_1, T_2, 5) \}$